

What is claimed is:

- 1 1. An optical communication system comprising an external cavity laser that
2 comprises:
3 a gain medium comprising an active region, a beam expanding region,
4 and an antireflective layer on a first surface of the gain medium;
5 an optical waveguide located adjacent the gain medium such that at
6 least a portion of the electromagnetic energy generated by the active region
7 passes through the beam expanding region and through the antireflective
8 layer into the optical waveguide; and
9 a Bragg grating integral with or coupled to the optical waveguide,
10 wherein the medium and the optical waveguide exhibit a coupling
11 efficiency of at least 40% with or without the presence of coupling optics located
12 between the gain medium and the optical waveguide, and
13 wherein the laser is configured and operated to provide a multimode output of at
14 least two modes.
- 1 2. The system of claim 1, wherein the coupling efficiency is at least 40%
2 with or without the presence of coupling optics located between the gain medium and the
3 optical waveguide.
- 1 3. The system of claim 1, wherein the gain medium comprises a cavity less
2 than 1 cm in length.
- 1 4. The system of claim 1, wherein the length of the system is less than 100
2 km.
- 1 5. The system of claim 1, wherein the laser is operated by direct modulation.
- 1 6. The system of claim 1, wherein the bit error rate of the system is less than
2 10^{-9} .

1 7. The system of claim 6, wherein the bit error rate of the system is less than
2 10^{-12} .

1 8. The system of claim 1, wherein the laser is operated at 2.5 GHz or greater.

1 9. The system of claim 1, wherein the laser is operated in the absence of a
2 temperature-compensating apparatus.

1 10. The system of claim 1, wherein the gain medium and optical waveguide
2 are coupled in the absence of coupling optics.

1 11. An optical communication system comprising an external cavity laser that
2 comprises:

3 a gain medium comprising an active region, a beam expanding region,
4 and an antireflective layer on a first surface of the gain medium;

5 an optical waveguide located adjacent the gain medium such that at
6 least a portion of the electromagnetic energy generated by the active region
7 passes through the beam expanding region and through the antireflective
8 layer into the optical waveguide; and

9 a Bragg grating integral with or coupled to the optical waveguide,
10 wherein the medium and the optical waveguide exhibit a coupling
11 efficiency of at least 40% in the absence of coupling optics located
12 between the gain medium and the optical waveguide,

13 wherein the laser is configured and operated to provide a multimode output of at
14 least two modes,

15 wherein the laser is operated by direct modulation,

16 wherein the laser is operated in the absence of a temperature-compensating
17 apparatus,

18 wherein the gain medium comprises a cavity less than 1 cm in length, and

19 wherein the length of the system is less than 100 km.

1 12. The system of claim 11, wherein the coupling efficiency is at least 40%
2 with or without the presence of coupling optics located between the gain medium and the
3 optical waveguide.

1 13. The system of claim 11, wherein the bit error rate of the system is less than
2 10^{-9} .

1 14. The system of claim 13, wherein the bit error rate of the system is less than
2 10^{-12} .

1 15. The system of claim 13, wherein the laser is operated at 2.5 GHz or greater